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Phoenix Roebelenii and Phoenix Loureiri

H. E. Moore, Jr.

One of the most attractive and adaptable small palms cultivated in the warmer portions of this country or in greenhouses is a dwarf species of the genus Phoenix which may be found variously labeled as Phoenix Roebelenii O'Brien, Phoenix Loureiri Kunth, or Phoenix humilis Royle var. Loureiri (Kunth) Becc. The proper designation for our cultivated material is Phoenix Roebelenii O'Brien and since there has been some confusion regarding this choice, a history of the names mentioned with descriptions and a brief bibliography may serve to clarify the situation.

In 1790, a Portuguese priest, João de Loureiro, published "Flora Cochinchinensis" based on his work during a period of more than thirty years in Cochinchina where he lived in the Annamese city of Hue. In this flora several palms were described, among them a species of Phoenix which he called Phoenix pusilla (fig. 13). The choice of name was unfortunate for in 1788 Gaertner had used the same name for a small species native in Ceylon. To rectify this situation in which two different species bore the same name, the German botanist Kunth renamed the Phoenix pusilla of Loureiro and called it Phoenix Loureiri.

† Sp. 1. PHŒNIX PUSILLA. α Cây-Cha la.

Differ. ſpec. Phœn. *floribus* hexandris : *caule* humili.

Hab., & notæ. *Palma caule* 2-pedali, craſſo, ſcabro. *Frondes* 6-pedales, inermes, pinnatæ, reclinatæ : *foliolis* longis, ſubulatis, plicatis, lævibus. *Flos* Dioicus : ſpathâ univerſali, polyvalvi : *ſpadice* erecto, brevi, corymboſo. *Calyx* utriuſque 3-partitus, breviſſimus. *Corolla* petala 3, ovato-oblonga, curva, patentia. *Maſculi Filamenta* nulla. *Antheræ* 6, oblongæ, corollæ æquales. *Fœminei* ſtylus brevis : *Stigmate* ſimplici. *Drupa* ovata, 4 lineas longa, carnoſa, nigra, lævis, dulcis : *nucleo* ſimplici oblongo, ſolido, corneo : hinc ſulco longitudinali, inde parvo circulo notato.

Habitat agreſtis in montibus Cổn *mít*, 6 leucis diſtantibus a metropoli Cochinchinæ *Huæâ*. Amat loca petroſa prope rivos.

Palma Dactylifera, minor, humilis, ſylveſtris : fructu minore. Burm. Zeyl. pag. 183. Herm. Parad. Bat. pag. 361. Kæmpf. Amæn. Exot. pag. 667.

Fig. 13. Original description of Phoenix pusilla Louriero, reproduced from "Flora Cochinchinensis."

Translating the original account we find that Loureiro described a small palm with a thick stem to 2 feet high, unarmed reclining leaves 6 feet long having smooth subulate plicate pinnae and short erect corymbose spadices bearing flowers with a very short three-parted calyx and oblong curved spreading petals, the male flowers with six stamens, the female at length producing an ovate fleshy black drupe 4 lines (8 mm.) long. The habitat was given as rocky places near streams in the mountains about six leagues from Hue. There appears to be no record of actual specimens of this palm in the few herbaria to which Loureiro sent collections. This description, therefore, with some supplementary references to earlier works is our only guide in attempting to apply the name Phoenix Loureiri.

Fig. 14. Phoenix Roebelenii, single-stemmed plant as seen in cultivation.

Nearly a century after Loureiro's flora appeared, the English orchid fancier James O'Brien in "Gardeners' Chronicle" for October 26, 1889, described another dwarf palm from Indo-China as Phoenix Roebelenii after the German orchid collector, C. Roebelen, who had sent plants from Asia. The material seen by O'Brien had no flowers hence only the vegetative state with its several slender trunks and graceful leaves was described and illustrated (fig. 14). Similarly, a supplementary note in the same journal for December 28, 1889 written by Roebelen gave information concerning habitat and habit of the plant as it occurred on the banks of the Mekong River in Laos but stated that he had been unable to discover seeds or flowers.

In the following year, Odoardo Beccari, the Italian student of palms, published a monograph of the genus Phoenix in the journal "Malesia" and in this work, on the basis of limited specimens and descriptions, considered Phoenix

Roebelenii synonymous with Phoenix Loureiri which he in turn made a variety of an Indian species as Phoenix humilis var. Loureiri. From this union of the two species which we now know to have been erroneous begins the confusion that persists today.

During the time that elapsed between Beccari's study of 1890 and his next notes on the species of Phoenix in Indo-China it is apparent that specimens of Phoenix Roebelenii had flowered in Europe. Chabaud, writing on P. Roebelenii in his book "Les Palmiers de la Cote d'Azur" (1915), stated that he had sent male flowers to Beccari who recognized that they were distinct from those of other Asiatic species. In "Webbia" (1910) Beccari revised his earlier opinion and accepted P. Roebelenii as a valid species with a question as to the identity of P. Loureiri. Again in 1911, reviewing the palms of Indo-China in the "Bulletin du Museum National d'Histoire Naturelle" (Paris), he briefly characterized P. Roebelenii and P. humilis (to which we may perhaps assume he assigned P. Loureiri) noting for the first time the acuminate petals of the male flowers of P.

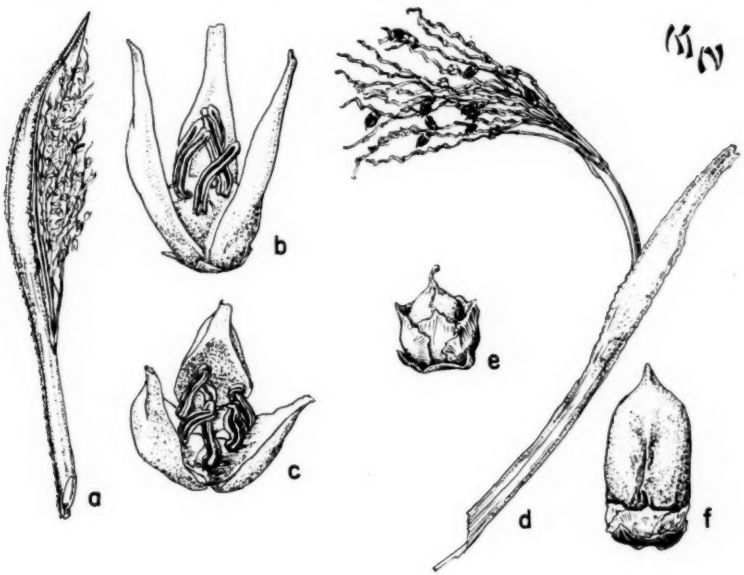

Fig. 15. Phoenix Roebelenii: a, male inflorescence, x 1/4; b, male flower, side view, x 4; c, male flower, open, x 4; d, female inflorescence, x 1/4; e, female flower, x 2 1/2; f, fruit, x 2 1/2.

Roebelenii (fig. 15b, c) which are similar to those found in only one other species, P. reclinata Jacq. of Africa.

Further accounts of P. Roebelenii have been given by Chevalier (1923), who included observations of M. Mieville made on wild plants in Laos, and by Marius Magalon who published a critical study of the palms of Indo-China in 1930. The most recent and complete account of the palms of Indo-China is that of Gagnepain and Conrard in Le Comte's "Flore Generale de l'Indo-Chine" (1937). These writers followed Magalon in part, accepting P. Roebelenii as a valid and well-marked species of limited distribution in the wild.

In accepting Phoenix Roebelenii as a distinct species the identity of P. Loureiri requires consideration. To ascertain what species should bear this name it is necessary to return to Loureiro's description and compare it not only with P. Roebelenii but with such palms as are known to occur in the region of Hue. There are certain phrases in the original description that are puzzling. The leaves are said to be unarmed while in all species of Phoenix the lower pinnae are modified into stout sharp spines. The spathe is said to be of many valves whereas in true Phoenix there is only one spathe. These statements may be attributed to error in observation or descriptions, a not uncommon feature of Loureiro's work as noted by Merrill who has published a lengthy commentary on Loureiro's flora. Disregarding these statements we find that Loureiro's palm has short thick stems rather than the elongate slender stems of P. Roebelenii. The leaves are longer, reclining and with smooth plicate pinnae rather than short and spreading with flattish pinnae that are usually prominently scurfy below. By inference we may suppose that the male flowers have petals with rounded rather than acute apices. Phoenix Roebelenii, furthermore, is known as a wild plant only from the northern regions of Indo-China in Laos and Tonkin and has never been reported from the region about Hue.

Certain modern collections from Tourane (Turan) near Hue appear to fit the greater part of Loureiro's description. These specimens, with others from several provinces of Indo-China are referred by Gagnepain and Conrard to P. humilis but in a varietal status as var. Loureiri, differing from the species in the very short or undeveloped stem, smaller leaves and inflorescences.

Thus more recent studies, including those of Beccari, have shown that the two taxa that Beccari originally placed together are in reality discrete. Unfortunately in his "Palms of British India and Ceylon" (1926), Ethelbert Blatter, a Jesuit priest and late Professor of Botany at St. Xavier's College, Bombay, apparently overlooked these later studies and adopted the early work of Beccari in which P. Roebelenii and P. Loureiri were considered synonymous and were treated as a variety of P. humilis. Blatter's disposition was followed in "Gentes Herbarum" (1949) and in Bailey's "Manual

of Cultivated Plants" (1948) although the variety was considered in specific rank as P. Loureiri. More recent workers including Hawkes "The Major Kinds of Palms" (1950), Hertrich "Palms and Cycads" (1951) and Mowry "Native and Exotic Palms" (revised 1952) have followed this unfortunate oversight and have used the name P. Loureiri in place of the more familiar and correct P. Roebelenii.

To provide a basis for comparison, descriptions follow for the two taxa as now recognized by Gagnepain and Conrard. All plants thus far seen in this hemisphere are P. Roebelenii and it is doubtful that true P. humilis var. Loureiri is in cultivation.

Phoenix Roebelenii O'Brien, in Gardeners' Chronicle, ser. 3, 6: 475, f. 68 (1889).

Stems several (or in cultivation often solitary), 1-2 or rarely to 3 m. high, to 10 cm. in diameter, annulate with scars of persistent leaf-bases: leaves 1-1.5 or rarely to 2 meters long, the pinnae deep green on both sides with scurfy tomentum on nerves below, linear, to 40 cm. long, 12 mm. wide, regularly arranged except at the very base where sometimes paired as are the orangish spines: spathe to 35 cm. long; spadices loosely branched, the rachillae to 20 cm. long; male flowers to 6 mm. long, the calyx 1 mm. high, the petals 5 mm. long, acuminate; female flowers globose, 3-4 mm. high: fruit with persistent perianth, 15-18 mm. long, 6-7 mm. wide, blackish at maturity.

Phoenix humilis Royle var. Loureiri (Kunth) Becc. in Malesia, 3: 382 (1890).

Phoenix pusilla Lour., Flora Cochinchinensis, 614 (1790), not Gaertner (1788).

Phoenix Loureiri Kunth, Enumeratio Plantarum, 3: 257 (1841).

Stems absent or very short, several: leaves 1 m. long, the pinnae glaucous, smooth, linear-acuminate, 20-30 cm. long, 7-15 mm. wide, mostly in groups along the rachis: spathe 20 cm. long or more; spadices exserted, densely branched, the rachillae mostly less than 15 cm. long; male flowers oblong-ovate, 8 mm. long, the calyx about 3.5 mm. high, the petals oblong, obtuse; female flowers globose, 4.5 mm. high: fruit oblong-ovoid, yellowish maturing red-brown, about 10 mm. long, 5 mm. wide.

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Major Groups Within the Genus Iris

G. H. M. Lawrence

Iris is a genus of 160 or more species. Many persons know that the bearded iris and the beardless iris compose two natural groups, and recognize the distinctness from them of the bulbous Spanish and English irises, but in general the majority of plantsmen do not know the large number of natural groups within the genus as a whole. This article is an introduction to the genus and to my ideas on the classification of its species. In general, it is adopted from a more technical paper published recently in "Gentes Herbarum" [vol. 8: pp. 346-371, 1953]. In using this classification, iris specialists should remember that it is designed to accommodate species of iris and not the multitude of clones of hybrid origin; the classification of the latter is a separate project to be intercalated later with this one. In a subsequent paper, a key will be published to the series of apogon irises.

Differences in underground stem type and rootstock are several in Iris and provide a primary basis for separation of major taxa within the genus. Four subgenera are recognized:

(1) the rhizomatous species
(2) those whose rootstock is a bundle of fleshy roots [somewhat resembling Dahlia toes]
(3) those in which it is a bulb lacking roots during the dormant period [the flowers with large showy standards], and
(4) those in which it is a bulb retaining fleshy roots during the dormant period [the flowers with tiny spreading standards].

The rhizomatous species are further subdivided on the basis of presence or absence of a beard on some or all perianth segments. The nature of the seed produced, its type of coat and presence or absence of a creamy-white appendage, called an aril, is also of diagnostic importance.

It is expected that contributions on Iris in future issues of "Baileya" will discuss species relationship. As a foundation to a better understanding of the groupings and their relationships within the genus, an illustrated key to the subgenera, sections, and subsections is given below:

1. Rootstock a conspicuous rhizome (fig. 16). Subgenus I. Iris

2. Outer perianth-segms. (falls) bearded with hairs (fig. 17). Sect. 1. Pogiris

3. Beard of multicellular clavate hairs (fig. 17a): seed lacking an aril (fig. 18). Subsect. 1a. Pogoniris

3. Beard of unicellular nearly cylindrical hairs (fig. 19): seed bearing a usually cream-colored aril (fig. 20).

4. Outer and inner perianth-segms. (standards and falls bearded, at least basally: rhizomes spreading by stolons (fig. 21). Subsect. 1b. Hexapogon

4. Outer perianth-segms. (falls) only bearded (fig. 22): rhizomes not stoloniferous.

5. Beard widely scattered over haft (claw) of outer perianth-segms. (fig. 23): rhizome not gnarled. Subsect. 1c. Oncocyclus

5. Beard along median line of fall: rhizome compact and gnarled. Subsect. 1d. Pseudoregelia

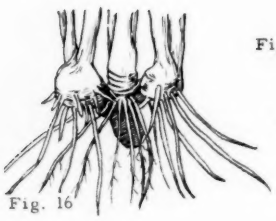


Fig. 16

Fig. 17

Fig. 17a

Fig 18

Fig. 19

Fig. 20

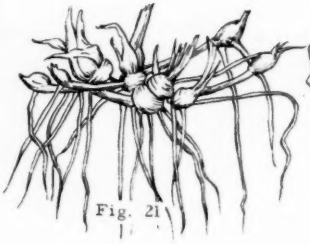


Fig. 21

Fig. 22

Fig. 23

2. Outer perianth-segms. (falls) not bearded, but sometimes crested. Sect. 2. Spathula

6. St. branching in 2's and 3's (falsely dichotomous) and seemingly paniculate (fig. 24) [see fig. 25 for flower]; seed with a small aril. Subsect. 2a. Pardanthopsis

6. Sts. not branching in 3's; seed lacking an aril.

7. Outer perianth-segms. (falls) smooth and lacking a crest (fig. 26).

8. Seeds vermillion-red, persisting in the capsule-valves after dehiscence (fig. 27): Sect. 2b. Foetidissima

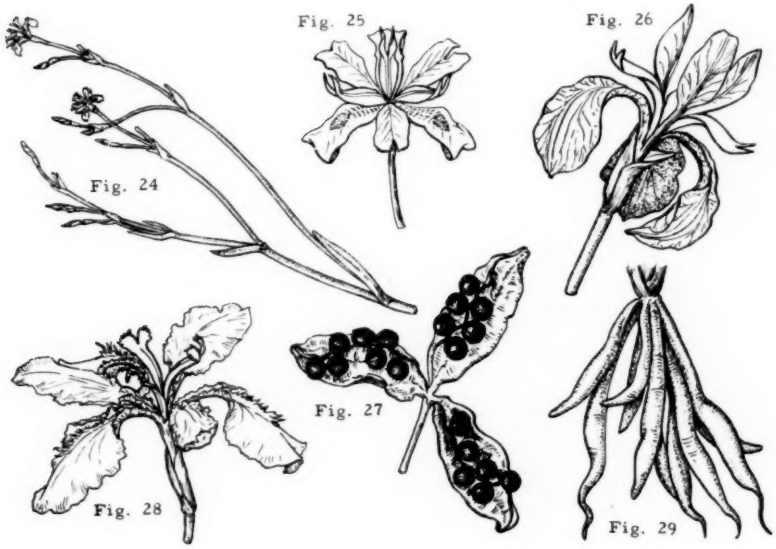
8. Seeds colored otherwise (mostly brown to black), not persistent within dehisced capsule. Subsect. 2c. Apogon

7. Falls with a cockscomb-like crest (fig. 28). Subsect. 2d. Evansia

1. Rootstock a bulb, or the roots fleshy.

9. The rootstock a bundle of fleshy roots arising from a minute rhizome terminated by a nipple-like growing point (fig. 29). Subgenus II. Nepalensis

9. The rootstock a bulb.



10. Bulbs lacking roots during the dormant period: inner perianth-segms. (standards) large and erect (fig. 30). — Subgenus III. Xiphium

11. The bulb with a thin membranous tunic (fig. 31). — Sect. 1. Xiphion

11. The bulb with a fibrous reticulate tunic (fig. 32). — Sect. 2. Reticulata

10. Bulbs with fleshy roots remaining attached during dormant period: inner perianth-segms. (standards small, often minute, spreading or deflexed (fig. 33). — Subgenus IV. Scorpiris

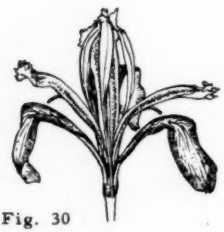


Fig. 30

Fig. 31

Fig. 32

The names used here are not always those used by Dykes in his well known monograph. Unfortunately Dykes did not apply the rules of nomenclature to the names of his sections and subsections as he did to the names of species.

Every genus has a type species, a species on which it is based. In Iris, that type is I. variegata [formerly it was Linnaeus' I. germanica, but that "species" has been demonstrated to be of hybrid origin and it is not known if Linnaeus' specimen was from the wild or was some cultivated iris of mixed origin]. If a genus is divided into two or more subgenera, the type species for the genus is also the type species for that subgenus in which it belongs. Iris variegata, L. is a rhizomatous bearded iris of tee so-called German Iris group. It is then the type of the subgenus comprising the rhizomatous irises. The Rules state further that the subgenus containing the type species for the genus shall bear the name of the genus. In this case, the rhizomatous irises belong to the subgenus Iris of the genus Iris.

These rhizomatous irises separate readily into 2 sections: the bearded and non-bearded. The bearded are subdivided into 4 subsections: the pogonirises, the oncos, the regelias, and pseudoregelias. These latter are common names for the subsections. Unfortunately, it has not been possible in every case to retain the name used by Dykes. In this group, the name regelia is a relative new-

comer and it is displaced by the older name Hexapogon. No one likes changes, least of all the iris enthusiast, but this name Hexapogon is not so bad after all. At least it is appropriate. The distinctive characterization of the regelias is that all six perianth segments (both standards and falls) are bearded, the standards less heavily so than the falls. The name Hexapogon is certainly more descriptive than is regelia [given by Sir Michael Foster in honor of Edward von Regel] for hexa - is from the Greek for 'six' and -pogon is from the Greek for 'beard'; six beards in the flower.

The non-bearded rhizomatous irises are sometimes loosely referred to as the apogons [meaning, 'without beard'] but strictly speaking not all non-bearded iris are apogons in the botanical sense, although the last are the best known and most abundant of the beardless rhizomatous species. Iris dichotoma, the Vesper Iris of northern China and Siberia, is unlike any other iris; not only because of its mode of branching, but because of its abundant small but attractive flowers open for only the latter half of each day and followed by others over an extended period of bloom in July and August. Its standards are small and erect, the falls are spreading and their coloring is in delicate patterns of veining. It does not hybridize with other species. In fact, it once was united in a genus [Pardanthopsis] with the Blackberry Lily [Belamcanda chinensis], which its flowers superficially resemble, but is most different in character of branching and capsule [as well as in technical details of the flower]. By all present concepts of the genus it is an iris, a beardless rhizomatous iris, but unlike any other species. To keep it on a classification level equivalent with other beardless rhizomatous species, I treated it as the only species of subsect. Pardanthopsis.

The crested or Evansia irises are also beardless rhizomatous species, but belong in a subsection by themselves. Genetically they are incompatible with most species of other subsections [a cross between I. tectorum and I. pallida, of sect. Pogiris, is known]. Each species is distinguished by a crest on the falls, a crest composed of more or less fringe-like proliferations of the blade and by very casual glance could be thought of as beard-like. They compose the subsection Evansia.

Iris foetidissima, known vulgarly as the Stinking iris and in more proper circles as Gladwin or Gladdon, is the only species of another subsection of beardless rhizomatous irises. Its herbage produces a strong foetid odor when bruised. A native of western Europe, to Greece and south to North Africa, it is genetically remote from other species and incompatible with them. Its horticultural merit is in its dehisced capsules, brilliant by the orange-red seeds that persist long after the values spread divergently. It is as distinct from the apogons as is I. dichotoma and, like the latter, deserves to be recognized as a member of a separate subsection, the sub-

section Foetidissima.

The true apogons, those beardless rhizomatous species remaining after removal of the evansias, and of I. dichotoma and I. foetidissima, comprise the fourth subsection Apogon. It is a very large taxon, containing perhaps 60 species. In a later article I will discuss them and include a key for their classification among 13 series [the category subordinate to that of subsection]. Here belong the sibericas, laevigatas, hexagonae [Louisiana or delta irises] and the majority of western American species.

The subgenus Nepalensis contains a single species so different from other irises that there may be good cause to treat it as a separate genus. The species, I. decora, Wall. [of which I. nepalensis, Don is a synonym] is Indian and is not or only rarely cultivated.

The bulbous irises belong to one of two subgenera: Xiphium and Scorpiris. The first includes the so-called Dutch or Spanish irises whose bulbs have a brown membranous tunic and the more hardy and dwarf reticulate irises whose bulbs have a fibrous more or less netted coat. The second, subgenus Scorpiris, contains the so-called Juno irises. These western Asiatic species of arid regions are not much cultivated. They are distinguished in flower by the small reflexed inner preianth-segments and, vegetatively by the fleshy roots that persist on the bulbs during the dormant period.

The Waterer Family and their Hybrid Rhododendron Introductions.

John C. Wister, Director
Arthur Hoyt Scott Horticultural Foundation
Swarthmore, Pa.

Since the time of Linnaeus, countless botanists have made careful Latin descriptions of the wild plants from all parts of the world, so that by reference to standard botanical works anyone can now find out not only the correct name of any plant but also the name of the botanist who named and first described it. Usually these descriptions include the "stations" where specimens were gathered, and sometimes an explanation of the derivation of the specific name. If it is a Latin adjective referring to a color, he may point out that this refers to the bark, to the berry or to the flower, as the case may be. If the specific name has been given in honor of a person, the botanist may explain why such name is attached.

Apparently, no botanical detail is overlooked in the original descriptions, yet to horticulturists there seem to be peculiar blind spots. Botanists have been so concerned with the scientific aspect of plant relationship that often they have failed to comment upon the general appearance of the plant, or its possible value in the garden. Charitably inclined gardeners will excuse the botanists on the ground that the work they have undertaken is so vast that they cannot go into further detail. More cynical persons will say that some (or many) botanists are interested only in dead plants pressed between herbarium sheets, and care nothing for the living plant or whether or not it is beautiful.

Many wild plants vary so much that some individuals of a given species may be of no value in a garden, while others may be very beautiful and important. It has fallen to horticulturists to search for individual plants of a given species for the purpose of selecting the most beautiful for garden use. This has been going on for centuries, but never to such an extent as in the present time. There have been and there still are being brought into our gardens forms of wild species of greater beauty than the ones originally collected by the botanists who made the first scientific descriptions.

After these forms have been brought into cultivation, new generations of plants are raised from seed and additional variation secured. Many of the best plants in today's gardens have originated in this way.

When wild plants from different areas or even different continents have been planted close together, bees have often effected cross-pollination. Bees even pursue this work in botanical gardens, with the result that when these gardens send out seed labeled with the name of a species, this seed often is actually of hybrid parentage and may produce new forms that never existed in the wild.

Man has long practiced the art of cross-pollination. We owe many of our best-loved plants to the patient work of plant-breeders, past and present. Most of these persons are little known, but some pursue the technique of self-advertisement in the manner of Burbank.

Among the nurserymen of the various countries there are great families that have pursued their work in the improvement of garden plants for several generations. The names of some of these are familiar to gardeners. Botanists as a whole have had little sympathy with such work. Some have considered their productions as insults, as if the hybridists were trying to prove that they could produce something better than nature (or God) could produce. The more tolerant regard the breeding of ornamental plants as of little lasting value. In this way they have much justification, as any perusal of catalogues of the past will show. Of the many thousands of varieties produced over the past century, only a small percentage continue to be grown in our gardens. It is inevitable that this should be true because of the very nature of the work of the hybridist. When he has produced something good, he immediately sets about to produce something better, which will immediately make the first production obsolete.

I have entered into this lengthy introduction in order to call attention to the exact records of the botanists, in contrast to the very inexact information, or even no information at all, that we possess nowadays concerning the origin of many of our finest garden plants. I believe Dean Bailey was the first to call attention to the need of herbaria containing cultivated plants, as well as wild plants. There is great confusion concerning the authenticity of many varieties of garden plants, because of the lack of such herbarium specimens and more exact descriptions. The horticultural practices of the day have become so involved that it is more and more necessary to have some permanent record of whatever information we can get concerning the origin of many of the best plants of our gardens.

In a small way I have been attempting to do this with a few groups of plants that we have been growing at the Scott Foundation. In some groups it is difficult to get anything, but the vaguest information. In others I have been able, through the help of many kind friends here and abroad, to piece together an interesting history of the plants and of the people who worked with them. Our garden rhododendrons fall into this latter group. Here the trail leads back to several dozen nineteenth century breeders in England, France,

Belgium, and Holland. Prominent among these - in fact, the most important to us - is the great British family of Waterer, about whom the following notes have been compiled from books, magazines, catalogues, and most of all from the kind help of Mr. Donald Waterer, the present secretary of the old Knap Hill Nursery.

Michael Waterer founded the Knap Hill Nursery In Woking, Surrey, about 1790, and apparently had rhododendrons in the early 1800's. After his death in 1827, his son, Michael Waterer II, became one of the important nurserymen of the day, and in addition to Knap Hill he purchased and managed a fine nursery in Bagshot. Interest in rhododendrons had become great. The famous Lord Carnavon of Highclere had crossed Rhododendron catawbiense from America with Rhododendron arboreum, the tree rhododendron of India. Other gardeners, amateur and professional, made crosses of other species. The nursery business flourished and the two Waterers, father and son, soon were naming and introducing new hybrid rhododendrons. This much is apparent from horticultural magazines of the day.

Before consideration of the rhododendrons known to have been introduced at Knap Hill, further reference to the history of the family should be made. In 1842 Michael II died. He left the Knap Hill Nursery to his brother Hosea, and the Bagshot Nursery to his brother John, and from that time to the present the two nurseries have gone their separate ways as rivals, each producing and introducing over 150 varieties of hybrid rhododendrons before the end of the century. Most of these have long since disappeared, as the botanists expected. In Great Britain, practically all are considered obsolete in the present rage for the modern large-flowered hybrids of Chinese and Indian species, which can be grown in the south of England and on our Pacific Coast. The importance of the older productions lies in their hardiness in the New England and Middle States of this country, where the modern British hybrids cannot be grown. Here these Waterer hybrids have kept enthusiasm for rhododendron-growing alive for nearly a century.

Hosea Waterer inherited the Knap Hill Nursery in 1842. His importance is shown in his 1851 catalogue which listed as productions of his firm (but not as novelties at all) the following top-notch "ironclad" varieties:

'Album Elegans'	'Glennyanum'
'Album Grandiflorum'	'Purpureum Elegans'
'Atrosanguineum'	'Purpureum Grandiflorum'
'Delicatissimum'	'Roseum Elegans'
'Everestianum'	'Roseum Grandiflorum'

What an astounding list this is! All of these varieties, after more than a century, are grown and revered here today. They must have originated with Michael II, or even Michael I, as seedlings

could hardly have been brought to the flowering stage, tested, and then propagated in quantity and grown to sufficient size to offer them for sale in nine years. From references in older publications, it seems probable that they originated in the 1830's and 1840's. Perhaps someday copies of older catalogues will be found, but that for 1851 is apparently the oldest known in this country or Great Britain.

Hosea died in 1853, leaving Knap Hill to his nephews, Anthony Waterer and Robert Godfrey. From 1853 until 1867 the firm name was Waterer and Godfrey. They continued to introduce fine rhododendrons, the best known and most important to us today being:

'Charles Bagley'	'Mrs. R. S. Holford'
'Charles Dickens'	'Old Port'
'H. H. Hunnewell'	'Roseum Superbum'
'H. W. Sargent'	'Stella'

It will be noted that two of the earliest important American amateur private estate owners are honored by having their names attached to fine rhododendrons [Hunnewell and Sargent].

In 1867, Anthony bought out Godfrey and continued the business under his own name, and the firm has been called Anthony Waterer ever since. Anthony, like his predecessors, was responsible for the introduction of great numbers of fine rhododendrons. His trade with America grew rapidly from his early contacts with Mr. Hunnewell, Henry Winthrop Sargent, and Edward S. Rand, and he exhibited 1500 plants in several hundred varieties at the Centennial Exposition in Philadelphia, thereafter selling thousands of plants in this country yearly.

The following are some of his important introductions, many of them named for prominent Americans interested in Rhododendron growing:

1870: 'Edward S. Rand', 'Ignatius Sargent', 'James MacIntosh', 'J. Marshall Brooks'
1871: 'Lady Armstrong', 'Lady Clermont'
1877: 'Kettledrum', 'Mrs. Harry Ingersoll'
1888: 'C. S. Sargent', 'Mrs. C. S. Sargent', 'F. D. Godman',
1891: 'Henrietta Sargent'

Anthony died in 1896 and left Knap Hill to his oldest son, Anthony II. His younger son, Hosea II, emigrated to America and conducted a seed store in Philadelphia until 1924, when, upon the death of Anthony II, he inherited Knap Hill and returned to England to manage it. Hosea II died in 1927 and his two sons, Anthony III and Harry, preferred to stay in America and accordingly sold the nursery in 1930 to their cousin, Gomer, of the Bagshot Nursery.

I have related how Michael Waterer II in 1842 had left the Bagshot Nursery to his brother John. The latter, in turn, in 1868 left

it to his son, John II. All these men produced fine rhododendrons. In 1893 it passed by inheritance to his sons, John III and Gomer, and they in 1913 took in a third partner, Bernard Crisp, changing the firm name to John Waterer, Son & Crisp. They added to the Bagshot Nursery the fine nursery in Twyford known as "The Floral Mite". This nursery became one of the finest in England. Of this firm, Gomer Waterer was the partner particularly interested in rhododendrons, and until World War I and the enactment of Plant Quarantine 37, supplied great numbers of plants to this country.

In 1929 Gomer retired from the Bagshot firm. When Knap Hill was offered for sale, he formed a company with Lionel de Rothschild to purchase it and kept it in the Waterer family. Gomer's son, Donald, served an apprenticeship in a British nursery and then in the Wezelenburg firm of Boskoop, Holland. Donald came to Knap Hill in 1935, joined the RAF in 1939, and on Gomer Waterer's death in 1945 became secretary of Knap Hill. He is responsible for the introduction of new varieties of the Knap Hill strain of azaleas, a strain dating back to the days of Anthony I, or even before, and best known perhaps by the variety 'Nancy Waterer'.

Sometime between 1924 and 1930 the seedlings of the Knap Hill strain had been divided into three parts. One part was retained at Knap Hill, one part taken by Lionel de Rothschild (to become the parents of the famous Exbury varieties), and one part sold to the Slocock Nursery of Woking. Plants or seeds of one of these groups were taken to New Zealand by Edgar Stead to serve as the parents of the Ilam strain of azaleas, now just becoming known in this country.

The present-day efforts of rhododendron breeders in England have been to produce finer and finer flowers for exhibition purposes. I do not know the merits of some of these varieties, even in England and on our West Coast, but it is clear that none of them is of importance to us in the East. We are entering an era of great rhododendron interest, and breeding work has been under way this past quarter century or more under the pioneers Joseph B. Gable, the late Charles O. Dexter, and G. C. Nearing. Now there are being added to these a half-dozen or more enthusiasts whose technical training and enthusiasm give us hope for great progress in the future. No matter what these efforts may bring forth in new varieties, we must remember that the foundation of our present-day garden rhododendrons rests with the Knap Hill firm of the Waterers, as is shown by the above lists. All honor is due this firm for these plants and for the inspiration they give us to make our gardens more beautiful in the future.

The Rock Lily [Arthropodium cirrhatum]

G. H. M. Lawrence

A member of the lily family [Liliaceæ] from New Zealand deserves wider acquaintanceship. It is the Rock-Lily, Arthropodium cirrhatum (Forst. f.) R. Brown, a handsome plant growing 3-10 dm. high forming a clump of bold glossy day-lily-like foliage and producing panicles of nodding white flowers that are about 2.5 cm. across.

Rock-Lily is grown in the open in California and has proven to be a good pot-plant to grow in the house. It has somewhat fleshy fibrous roots, and its cultural requirements are much the same as those for Anthericum, sometimes known as St. -Bernard-Lily.

The genus Arthropodium is native to the Australasian region and contains about 8 species. The two from New Zealand [A. cirrhatum and A. candidum] are cultivated here. There are about 5 species in Australia and one in New Caledonia. Two of the Australian species (also with white flowers) have been grown in Europe but neither is as hardy as those of New Zealand. The name Arthropodium is from the Latin and means "joint-foot" in allusion to the jointed flower pedicels.

Arthropodium is allied to Anthericum. In fact, the Rock-Lily was placed in that genus by Georg Forster [1754-1794] whose name and description of it were first published in 1786. It was Robert Brown who, in 1882, separated it as Arthropodium. The genus is distinguished from its allies by the flower pedicels jointed at the middle and by the curiously bearded stamens. Note in figs. 34h and 34i that the anthers are small and 2-celled at the tip of the stamen. Below each anther is a thickened 2-tailed appendage covered with a white-woolly beard. In other respects the flowers are typically liliaceous; a perianth of 6 tepals, the stamens 6, the ovary superior and 3-celled, and the fruit a small subglobose capsule containing many minutely granulate black seeds.

Arthropodium cirrhatum is readily available in America. Seeds have been offered recently by Rex Pearce, Moorestown, N. J., and earlier by Pioneer Seed Co., Dimondale, Mich. Plants are listed by Samuel Ayers, La Cañada, Calif. and by Oakhurst Gardens, Arcadia, Calif.

A second and more delicate species is Arthropodium candidum, which grows 1 - 3 dm. high, has slender grass-like foliage and an abundance of tiny white flowers about 6 mm. across. The inflorescence is racemose, and is more slender than that of A. cirrhatum. It is less commonly grown and the only American source reported is several years old: seeds were offered by Rex Pearce in 1946. Plants are offered by Duncan & Davies, of New Plymouth, N. Z. who also offer under the name of rubra, "a rare form.... with beautiful coppery-bronze foliage."

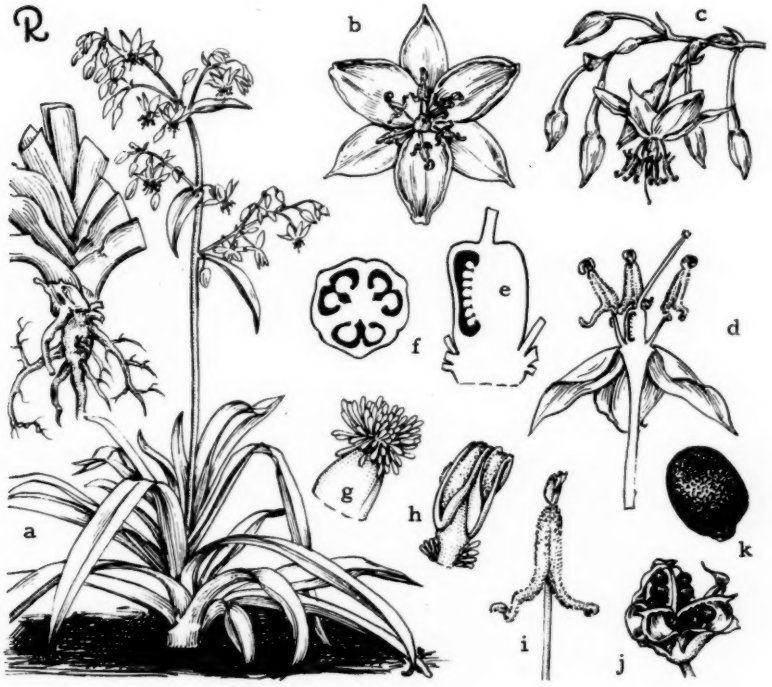


Fig. 34. Arthropodium cirrhatum: a, plant in flower, x 1/6; b, flower, face view, x 1; c, branch of infl., x 3/4; d, flower, vertical section, x 1 1/2; e, ovary, vertical section, x 5; f, ovary, cross section, x 6; g, stigma, x 24; h, anther, x 9; i, stamen, upper half, x 3; j, capsule, x 1 1/2, k, seed, x 6. [Drawn by Marion Ruff Sheehan]

An Oriental Holly in the Gulf South

John V. Watkins
University of Florida, Gainesville, Fla.

In the list for plant collaborators of the United States Department of Agriculture for the year 1926, there was noted plant introduction entry number 63526, Ilex rotunda. Agricultural Explorer F. A. McClure is said to have first seen the tree in fruit in Canton, China, although authorities tell us that this attractive holly is also a native of Korea and Japan, from where it was introduced to Europe a century ago. Mr. McClure sent seeds back to Washington, some of which were forwarded to the different plant introduction gardens and seedlings were grown for dissemination to plant experimenters.

In 1927 my major professor at the University of Florida, E. L. Lord, received from these seedlings male and female trees grown at one of the plant introduction gardens. He immediately set them in good garden earth by the shore of a shallow pond in the northwest quadrant of Gainesville. Apparently there were no cultural problems, and introduction number 63526 grew well in its new environment, and showed remarkable resistance to insects and diseases.

This holly is characterized by evergreen leaves that are entire, elliptical, and very glossy-green. The pistillate trees usually bear countless numbers of bright red berries in axillary clusters up and down the slender drooping branches of the current season's growth. The fruits are smaller and much more abundant than are the fruits of the American holly. The female tree in Lord's garden soon came to be well known among garden lovers of northern Florida, as this striking tree was displaying all of the qualities of a top-ranking evergreen specimen for winter color in the Gulf Coast region.

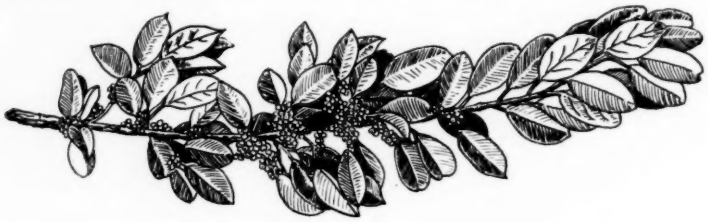


Fig. 35. Fruiting branch of Ilex rotunda.

Ilex rotunda was first described by Thunberg in 1784, from plants growing in Japan. It was first introduced to gardens of the New World by collections sent by Robert Fortune and distributed through the English firm of Standish and Co. Ltd. in 1850 or the year previous. For some time it was distributed as I. microcarpa Lindley [who named it this, unaware that it was Thunberg's Japanese species]. The tree grows to 12 m. in height and, like other members of the Lioprinus section, produces its flowers in leaf axils of the new growth. It is allied to I. pedunculosa Miq. [also a Japanese species, but much more hardy], differing in the flowers in umbels, the petioles nearly twice as long, and the fruits slightly smaller on pedicels half as long [about 3-8 mm. in I. rotunda]. The name rotunda is believed to have been suggested by the often rounded leaf bases. Rehder gives Japan and Korea as the region of nativity but specimens of native material from eastern China are in the herbarium at the Bailey Hortorium.

Alfred Rehder stated in his Manual that Ilex rotunda is hardy well up into the Carolinas, and so its endurance of temperatures experienced in the Gulf Coast area during the past 26 years has not been surprising. At Kingsville Nurseries, Kingsville, Maryland, in 1951 I viewed specimens of Ilex rotunda growing successfully under the protective canopy of native deciduous trees. Tampa is perhaps the southern limit of Ilex rotunda at the present time. Many beautiful grafted specimens grow in that city, and it is possible that there are a few garden trees south of that point.

Cuttings of Ilex rotunda root in about eight weeks. The heavily rooted plants grow well in an acid compost of leafmold, peat, loam and manure. In our experience, this organic soil, highly complex in nature, makes an excellent medium for the growing of Ilex, especially in sandy soils.

Later tests with spring and autumn tip cuttings showed that either class will root satisfactory numbers, but it was observed that cuttings from the first hardened spring flush will grow off much better after potting than will those taken as winter-rooted tips. These spring cuttings root readily under constant mist. Commercial practice in one of northern Florida's large propagating nurseries is to graft scions from the original heavy-fruited Lord tree into seedlings of Ilex rotunda. A suitable staminate type named 'Romale', is also grafted and sold as a companion to ensure availability of pollen.

Strangely, public acceptance of this striking holly has been slow despite the fact that all who see it in fruit exclaim over its beauty.

The Scarlet Episcias

H. E. Moore, Jr.

Of four species of Episcia currently offered for sale in this country, the two most common, E. cupreata (Hook.) Hanst. and E. fulgens (Lind.) Hook., have bright red or orange-red flowers. Botanically they are quite distinct but they have sometimes been confused in the trade, both under the name E. coccinea Hort. The leaves of both species tend to vary in color and pattern, especially so in E. cupreata, but flowering plants may be separated as follows:

1. Corolla-tube about 2.5 cm. long, the inside yellow with red spots, the outside reddish and rather prominently angled on the upper side, yellowish with red markings and swollen at the throat on the lower side, the upper two lobes of the corolla generally bent backwards: calyx-lobes usually entire or with few inconspicuous teeth at the tip. (Fig. 36. Ac) E. cupreata

1. Corolla-tube about 3.5 cm. long, the inside pink with obscure lines but no spots, the outside uniformly red, nearly straight and not or scarcely enlarged at the throat, the corolla-lobes all slightly bent forward: calyx-lobes generally rather conspicuously toothed at the tip. (Fig. 36. B) E. fulgida

Flowers of E. cupreata tend to vary in respect to the length of the lobes which may range from 6 - 7 mm. long by 8 - 9 mm. wide to

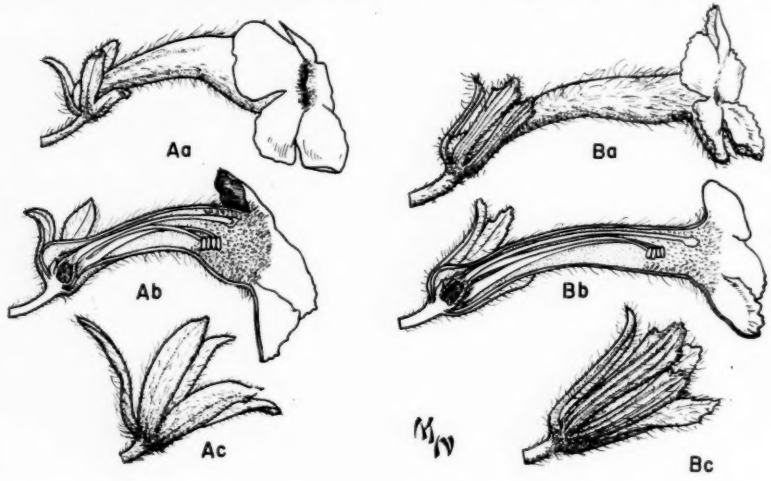


Fig. 36. A, Episcia cupreata, Aa, flower, exterior view, x 1; Ab, flower in longitudinal section, x 1; Ac, calyx, x 1 1/2; B, Episcia fulgida, Ba, flower exterior view, x 1; Bv, flower in longitudinal section, x 1; Bc, calyx, x 1 1/2.

12 - 13 mm. long by 12 - 15 mm. wide but the tube is rather stable in length being generally 2.5 cm. long. Flowers of E. fulgida are more constant in size, with the tube generally 3.5 cm. long, the lobes 10-12 mm. long by 10-11 mm. wide. In addition to differences in size and shape there are associated differences in color. E. cupreata has the corolla-tube rather prominently yellow-tinged below and the lobes are of a more orange-red or scarlet corresponding to Dutch Vermillion or Scarlet of the R. H. S. Color Chart. In E. fulgida the tube is a uniform red slightly paler than the Orient Red or Blood Red lobes.

Both species are natives of Colombia and are handsome subjects for hanging baskets or for ground cover under greenhouse benches where the light is diffused and humidity high. The velvety leaves are often 10-11 cm. long and beautifully patterned. Those of E. fulgida are dark or bronzy green with a silvery midvein and lateral nerves. Those of E. cupreata are variable and at least three cultivars have been based on leaf color. These are cv. 'Cupreata', the typical sort in which the leaves are deep coppery green without prominent pale nerves, cv. 'Metallica' in which the leaves are olivaceous with broad pale stripes and margined with metallic red and cv. 'Viridifolia' in which the leaves are light green with sometimes rather prominent pale veins. Intermediates appear in cultivation, sometimes with fancy names, and the designations should definitely be considered of horticultural rather than botanical rank. The last phase has also been listed as Episcia splendens Hanst. which appears to be synonymous with E. cupreata representing the green-leaved form. If future study shows any adequate difference it would appear that an older name, Cyrtodeira Trianæ Hanst., should be transferred to Episcia and used in preference to Episcia splendens.

The name Episcia coccinea Hort., as previously noted, is often applied to one or both of these species. It appears to have originated in an advertisement of new plants offered by B. S. Williams in Gar-

Fig. 37. Episcia cupreata, habit, 1/3.

deners' Chronicle, Ser. 3, 1: 490 (1875) where it was listed as Cyrtodeira coccinea Bull without description but with a reference to a forthcoming catalogue. Neither this catalogue nor an adequate description prior to the next have yet been located. Shore and Miller in Bailey's Cyclopedia of American Horticulture (1901) give a brief description and attribute the combination Episcia coccinea to Bentham and Hooker but such a combination is not to be found in their "Genera Plantarum" nor is it listed by "Index Kewensis". Parey's "Blumengärtnerei" (1932) also cites Bentham and Hooker as combining authors but perhaps follows the treatment in Bailey. The first combination and description appear to be those of Shore and Muller in Bailey's Cyclopedia and should be cited from that book unless earlier evidence can be found. However, since Episcia coccinea seems to be nothing but a cultivated form of E. cupreata such technicalities need not concern the cultivator and the name should be dropped.

ASTER DIPLOSTEPHIOIDES AND A. ALPINUS

The name Aster diplostephioides is current in several American trade catalogues. Plants grown from seed received under this name flowered this year in the Hortorium garden as have other similar asters received under other names.

Aster diplostephioides (DC.) Benth., a native of the Himalayas, is a biennial or perennial species producing single-headed stems 16-24 in. tall. Its ray-flowers are lavender-purple and the disc-flowers blackish-purple in bud and yellow within. The achenes bear an inner pappus of rust-red silky hairs and an outer pappus of minute whitish scales. The outer involucral bracts are described as 18-20 mm. long.

Material cultivated in Ithaca under this name closely resembles this description but is not this species. It differs in the disc-flowers being bright yellow in bud and when open, in the outer pappus absent or apparently so, and the involucral bracts scarcely exceeding 12 mm. in length and never becoming leaf-like in size. A study of this plant with other similar Asiatic species indicates it to be Aster alpinus var. longipedunculatus Rehnlt.

The plant is most attractive, produces an abundance of bloom, and the heads are long-lasting when handled as cut-flowers. The plants are stoloniferous and thus perennial. It is suspected that they are clump-forming.

G. H. M. L.

Col. Robert H. Montgomery [1872 - 1953].

H. E. Moore, Jr.

The death of Colonel Robert H. Montgomery in Coconut Grove, Florida, on May 2, 1953 brought to a close the work of a man who, for more than a quarter of a century, had among his avocations that of the building of plant collections. As a man of business - accountant, lawyer, writer, army officer - Colonel Montgomery made a lasting impression on his field. As a lover of plants he has made an impression no less profound and the magnitude of his influence on horticulture through this avocation has yet to be fully appreciated.

In the beginning, influenced by the late George P. Brett of the Macmillan Company, aided and abetted by L. H. Bailey and others, his interest in plants found chief expression in the assembling of a collection of conifers on the grounds of Wild Acres, his home at Cos Cob near Greenwich, Connecticut. There, within easy reach of New York City, he preserved a splendid stand of virgin hemlock and supplemented it with cone-bearers from the world over. The collection served not only as a source of personal pleasure but as a study area for students of the conifers, among them Dr. Bailey who relied on it in part when writing "The Cultivated Conifers". On his retirement from active work in the New York area a major portion of the collection, consisting of about 100 species, varieties and forms in 15 genera, was transferred to a 13 acre tract in the New York Botanical Garden. Now known as the Montgomery Conifer Collection it has been open to the public since 1949. The remainder, with its native forest and still rich representation of cultivated species, has been offered to the town of Greenwich as a public preserve.

A second phase of his interest in plants began when he moved to southern Florida in 1932. Here the wealth of tropical plants with potential usefulness in the region presented another challenge and in particular the cycads and the palms, that group of plants generally most closely associated with the tropics in the mind of the northerner and the family of plants in which his friend Bailey was engrossed. On their estate at Coconut Grove near Miami, he and Mrs. Montgomery commenced to do with the palms what had been done with the conifers in Connecticut. Over the years a collection second to none in the country was established representing over 300 species capable of surviving under Florida's climatic conditions.

That this collection was not merely an assembly of trees was obvious to anyone privileged to stroll about the grounds with Colonel or Mrs. Montgomery. Dr. Bailey was a frequent guest and utilized the collection in his studies. It has been my great fortune to continue this use and to observe the Colonel's intimate knowledge of the kinds of plants about him.

There are limits, however, to the value of private collections. Realizing this, stimulated by his association with the New York Botanical Garden and the Arnold Arboretum, familiar with the botanical gardens of the American tropics and fired by the work of his close friend, David Fairchild, the idea of establishing a public garden took root. From this idea, fostered by Mrs. Montgomery and aided by a host of friends, grew the Fairchild Tropical Garden with its Montgomery Palmetum which today is a cardinal attraction for the resident, tourist, horticulturist and botanist in Miami. The story of its beginnings and continued growth has been set down by Mrs. Lucita Wait in "Fairchild Tropical Garden - The First Ten Years" (Ronald Press Company, New York, 1948). Now reaching the close of its second decade, the garden has made its mark not only as an institution of southern Florida but as the major tropical garden of the United States and as one of the important botanic gardens of the hemisphere.

Colonel Montgomery has been honored in many ways in both the business and horticultural worlds but the continuing tribute of the living collections he has left us has been perhaps best expressed by David Fairchild who wrote on the occasion of the Colonel's 80th birthday in 1952. "Almost everyone likes to think he will be remembered long after he is gone. Many of them, like the Pharoahs of Egypt, make enormous piles of rock and hope nobody will disturb their eternal sleep. There are only a few who have the imagination to see that living growing things, like the Palms, have the power to create beauty in increasing amounts each year and as time passes to fill a whole countryside with a charm that it otherwise would not have had. You have chosen this way to fame and as the palms in the Garden you have founded grow taller each year they open their leaves and spread them out and bring quiet and a wonderful sense of beauty to all who wander in their shade."

FRUITS, CONES, AND STROBILI

Botanists define a fruit as a ripened ovary. There are many kinds of fruits, even by this definition, and in some the accessory parts are more conspicuous than is the ripened ovary. This note is not a discussion of the kinds of fruits but a discussion of them in relation to other analagous structures. The conventional fruit is a seed-bearing organ, for the seeds are the fertilized and ripened ovules within an ovary. By extension of this usage, the seed-bearing cones of pines and other conifers are referred to by some authors as fruits. Certainly the pine-cone is a fruiting structure, even if it is not a fruit in the sense of being a ripened ovary [since the ovules of conifers are borne naked on sporophylls and are not enclosed within an ovary].

If then, the ripened fruiting structure of a conifer is a cone [hence the name conifer; cone-producing], what does one call the "flowering" structures. In the first place, our dominant flowering plants are the Angiosperms. They include the lilies, peonies, roses, begonias, asters, etc. Our terminology has, to a large extent, developed from knowledge of them. For this reason, there has come into the descriptive literature of the gymnosperms such expressions as flowers, stamens and staminate cones, and carpels and pistillate cones. Stamens and pistils are organs found in the angiosperms. They do not occur in the gymnosperms. The gymnosperms include the conifers, the ginkgo, the cycads, and the ephedras.

The female structure in the conifers is usually cone-like. Excluding certain exceptions [as in Taxus, Torreya, Podocarpus], it has a central axis or column and on it are ovule-bearing scales called sporophylls. Each scale or sporophyll is produced in the axil of a bract. This bract may be small or larbe, free from the scale or fused to it. Persons familiar with cones of Douglas fir (Pseudotsuga) may recognize them by the thin flexuous bracts that extend well beyond the scale tips. In pines (Pinus) the scale is completely fused to and scarcely distinguished from the bract. There are many technical reasons why this ovule-bearing structure is not a flower, it is not even homologous to an angiosperm flower. One reason is the presence of the bracts, of which no counterpart exists in an angiosperm flower. In many respects, it is more like an inflorescence than a flower. The structure is basically a cone; to distinguish it from the fruiting cone, it may be referred to as a female cone or an ovulate cone. For those who wish to reserve the term cone for the fruiting stage of development, it is equally correct to refer to it as the female or ovulate strobilus. 'Strobilus' is the Latin for cone. It is incorrect to designate it as a "pistillate cone." A pistil is the organ of the angiosperm flower composed of the ovary and stigma (with ovules inside of the ovary).

No pistil is present in the gymnosperms, hence the female strobilus contains no pistil nor pistil-like structures.

The male structure in the conifers is also usually cone-like. It has a central axis, as does the female strobilus, but differs in that the scale or sporophyll on which the pollen-sacs are borne is not subtended by a bract. Each scale bears 2-15 pollen-sacs on the lower side (the number varying with the genus and species). This pollen-producing structure is a male cone or strobilus.

In Hortus III the terms male strobili and female (or ovulate) strobili will be used for the respective "flowering" structures and the term cone will be used for the seed-bearing unit. Many of the distinctions made above are distinctions of words. No one is really confused when reading of "staminate" cones or flowers, or even of "pistillate flowers", of the conifers. We know what is meant and that is the important consideration. However, language can give precision without becoming technical or obnoxious. The points emphasized here are in the interest of more accurate usage, reserving some words [as "pistillate" and "flower"] for the structures to which they belong and refraining from using them loosely or in the wrong place. Correct usage, in these instances, carries with it an understanding of the biological situations and of the distinctions that separate the gymnosperms from the angiosperms.

G. H. M. L.

IS CHUSQUEA CULTIVATED IN NORTH AMERICA?

The name Chusquea tessellata Munro appears in Hortus Second for a Colombian species of bamboo. No specimens of it from cultivation are in the herbarium of the Bailey Hortorium and it is not known to be offered in the American trade. The plant is reported to have been cultivated at the U. S. D. A. bamboo gardens near Savannah, Georgia. This note is published in an effort to learn whether the plant is known to be cultivated privately or commercially.

Chusquea is a tender genus of the Bambuseæ tribe of Gramineæ, characterized by the usually climbing or clambering habit of the slender sts., the fertile shoots often in axillary fascicles on the sterile ones, and the spikelets 1-fld. in condensed (rarely open) panicles. It is native from the Chilean Andes to Mexico. Unless evidence is brought to the Editor's attention that it is now in cultivation in this country, the name will be omitted from Hortus III.

G. H. M. L.

ABBREVIATIONS USED IN BAILEYA

[Excluding abbreviations of author names following binomials etc.]

ann.	annual	dm.	decimeter	lf.	leaf
bien.	biennial	fl.	flower	lft.	leaflet
br.	branch	fls.	flowers	lvs.	leaves
brt.	branchlet	flt.	floret	mm.	millimeter
caps.	capsule	fr.	fruit	per.	perennial
cl.	clone	ft.	foot	segm.	segment
cm.	centimeter	hort.	horticultural	st.	stem
cv.	cultivar	in.	inch	sts.	stems
diam.	diameter	infl.	inflorescence	var.	variety

METRIC - ENGLISH EQUIVALENTS (approximate)

6 mm. - 1/4 in.	10 cm. - 4 in.	10 mm. - 1 cm.
12 mm. - 1/2 in.	1 dm. - 4 in.	10 cm. - 1 dm.
25 mm. - 1 in.	3 dm. - 1 ft.	10 dm. - 1 meter
2.5 cm. - 1 in.	10 dm. - 1 yd.	
5 cm. - 2 in.	1 m. - 39 in.	